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Notice of Allowability	Application No.	Applicant(s)	
	10/621,293	GARMANY ET AL.	
	Examiner	Art Unit	
	Leila Malek	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 08/21/2007.
2. ☒ The allowed claim(s) is/are 1-10, 17-45, and 47-56.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other _____ |
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DETAILED ACTION

Response to Amendment

1. This office action is in response to the amendments received on 08/21/2007.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Jeffrey Hood on 10/18/2007.

The application has been amended as follows:

- a. In claim 19, page 6, line 2, "peak" has been replaced by peaks
- b. In claim 29, line 1, "resolving signs" has been changed to: resolving sign ambiguity
- c. In claim 54, lines 16 and 17, "of the accepted peaks;" has been replaced by in the second list;

Allowable Subject Matter

3. Claims 1-10, 17-37 and 49-51 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method/apparatus comprising: identifying the one or more major echoes present in the input signal; identifying the one or more minor echoes from a filtered autocorrelation function of the input signal in response to a

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determination that there is only one major echo; identifying the one or more minor echoes from a filtered power spectrum of the input signal in response to a determination that there is more than one major echo; computing a channel spectrum estimate from the one or more major echoes and the one or more minor echoes; wherein the channel spectrum estimate is usable to remove at least a portion of the one or more major echoes and the one or more minor echoes from the input signal.

4. Claims 38-44 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method comprising: computing a transform of each block of samples of a received input signal to generate a second stream of signal spectra; performing a frequency-domain autocorrelation operation on each signal spectrum of the second stream to obtain a third stream of power spectra; filtering the third stream of power spectra to obtain a filtered stream of power spectra; computing an analytic signal by performing an inverse transform of a current one of the filtered stream of power spectra over non-negative frequencies; estimating complex coefficients for a set of echoes from an analysis of pulses in selected intervals of the analytic signal, given a current estimate of delay times for the set of echoes; generating a revised channel spectrum estimate from phase changes of the estimated complex coefficients and the current estimate of the delay times; repeating the above last three steps; updating the set of echoes including delay times in response to an update condition.

5. Claims 45, 47, and 48 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose,

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either alone or in combination, a method comprising: performing a frequency-domain deconvolution operation on one or more signal spectra of an input signal using a channel spectrum estimate to obtain one or more corresponding deconvolved spectra; computing an inverse transform of each of the deconvolved spectra to obtain deconvolved blocks of samples; and recovering information from the deconvolved blocks of samples.

6. Claims 52 and 53 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either alone or in combination, a method comprising: determining that there is more than one major echo in a received signal; computing a spectrum F corresponding to a sum of the major echoes; computing a filtered power spectrum of the spectrum F ; subtracting the filtered power spectrum from a filtered power spectrum of the received signal to obtain a difference spectrum; performing a stabilized division of the difference spectrum by a conjugate of the spectrum F to obtain an intermediate spectrum; computing an inverse transform of the intermediate spectrum to obtain a time-domain signal; estimating one or more of the minor echoes from the time-domain signal to obtain echo parameters for the one or more minor echoes; storing the echo parameters for the one or more minor echoes in a memory, wherein the echo parameters are usable to remove at least a portion of the one or more echoes from the received signal; adding the one or more minor echoes to the spectrum F .

7. Claims 54-56 are allowed. The following is an examiner's statement of reasons for allowance: a comprehensive search of prior art of record failed to disclose, either

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alone or in combination, a method comprising: determining that there is only one major echo in a received signal; computing an amplitude envelope of a filtered autocorrelation function of the received signal; generating a first list of peaks in the amplitude envelope, excluding a peak at zero delay, that exceed an amplitude threshold; determining the number of peaks in the first list; performing a first procedure in response to a determination that the number of peaks is greater than or equal to three, wherein the first procedure includes: accessing two peaks of largest amplitude from the first list; removing the accessed peaks from the first list, and adding delay times and complex amplitudes corresponding to the accessed peaks to a second list; computing a table T of differences between pairs of delay times in the second list, and computing a table S of sums of pairs of delay times in the second list; deleting from the first list any peaks whose delay times correspond to at least one of the generated sums in table S or at least one of the differences in table T; accessing a next peak of largest amplitude from the first list, and repeating the steps corresponding to removing the accessed peaks, computing the tables, and deleting the peaks from the first list, in response to a determination that the first list is nonempty.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leila Malek whose telephone number is 571-272-8731. The examiner can normally be reached on 9AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone

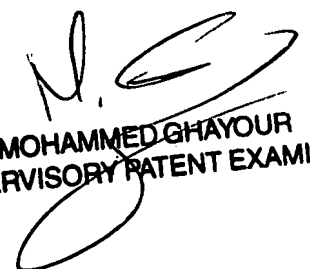
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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Leila Malek
Examiner
Art Unit 2611

L.M.


MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER